Grazing and Pasture Lands

Description

The proper management of grazing lands (range and pasture) can both meet individual farm and ranch livestock production goals and play a role in nationwide efforts to increase soil carbon sequestration. Atmospheric carbon fixed by growing forage plants is translocated to roots and incorporated into the soil carbon pool via humification. By far, the most important factor governing the direction and rate of carbon flux in grazing lands is short-term climate variability, particularly rainfall and temperature. Planning to sequester carbon in arid rangelands (<200 mm annual precipitation) is particularly challenging because of the low productivity and high year-to-year variability. In regions where annual rainfall is higher and more reliable, for instance, the northern Great Plains, there is a higher probability that plains will sequester larger amounts of carbon.

The most important management decision affecting carbon sequestration is stocking rate (grazing animals/land unit/year); balancing animal numbers with forage supply ensures optimal plant production and supply of carbon to soil microorganisms to maintain and increase soil carbon. Other adjustments to livestock grazing, such as season of use and distribution, can contribute to improved management, but the amount of available forage consumed by livestock is the overriding management control. Thus, while there is a well-recognized benefit at the local scale in enhancing ecosystem resilience (adaptation), many rangelands may not be suitable locations for managing to increase soil carbon in the context of mitigating climate change.

Soil carbon sequestration can also be increased by restoring degraded land to perennial vegetation. Restoration may either be via seeding native species and then extensively managing as rangeland or by planting improved species and intensively managing as pasture with additions of supplemental water and/or nutrients.

This building block has three separate elements:

1. Increase the application of Prescribed Grazing (NRCS Practice Code 528) to range and pasture lands grazed by domestic livestock;
2. Ensure that land treated with Forage and Biomass Planting (Code 512) is properly maintained and managed; and
3. Ensure that land treated with Range Planting (Code 550) is properly maintained and managed.

Each of these elements is described in detail below:

1. *Increase the application of Prescribed Grazing (528) to range and pasture lands grazed by domestic livestock in appropriate regions.*

Prescribed Grazing is a longstanding NRCS practice with proven positive results. The practice involves NRCS staff working with land managers to adjust livestock numbers (stocking rate), livestock distribution, season of use, and kind of animal into balance with forage supplies. Successful implementation requires at least annual monitoring and adjustment of livestock numbers.

Together range and pasture lands exceed more than 500 million acres in the US Land Inventory. Over the past decade (2005-2014), the amount of land reported annually as being treated with prescribed grazing has varied from 4.5 million acres to more than 18 million acres. Proper management of grazing lands can sequester carbon in the soil, particularly when rainfall is near normal. In arid areas (<20" average annual rainfall), grazing lands can be expected to sequester around 0.14 Mg CO_2e/acre/year, while more mesic areas (20-35" average annual rainfall) can sequester around 0.2 Mg CO_2e/acre/year. Assuming an average of 0.17 Mg CO_2e/acre/year across all lands, sequestration would vary from 765,000 Mg CO_2e/year to 3,060,000 Mg CO_2e/year. NRCS has established a target of 18 million acres of Prescribed Grazing annually on range and pasture lands with a 10-percent increase in acreage applied each year between 2016 and 2025.

Climate analysis and predictions indicate that the most likely place to target for increases in soil carbon increases are the upper Midwest and Northern Great Plains. These regions are projected to have the most reliable growing conditions and the most opportunities for livestock grazing management consistent with soil carbon increases. The Southwest and Southern Plains are projected to see increasing variability and more frequent drought conditions, suggesting less likelihood of sequestering increasing amounts of carbon through livestock grazing management.

2 and 3. Maintain the application of Range Planting (550) and Forage and Biomass Planting (512) at current levels and increase emphasis on Prescribed Grazing (528)

Range Planting (550) and Forage and Biomass Planting (512) are land conversion practices and are implemented on relatively few acres annually. Both practices require seedbed preparation, cover crops and seeding with native (range) or improved perennial (pasture) species of grasses and forbs. Combined, both practices were applied on fewer than 250, 000 acres annually over the past decade. On average, establishing perennial vegetation for livestock grazing on existing cropland will sequester approximately 1.0 Mg CO_2e/acre/year, resulting in 0.25 Mg CO_2e/year nationally. Although substantial amounts of soil carbon may be gained via the conversion of long-term cropped land to perennial pasture in the Southeast region, high input costs limit the net GHG benefits to similar cropland conversion estimates.

These practices will continue to sequester carbon over a lifespan of about 20 years before they reach equilibrium. Post-equilibrium, they will continue to sequester carbon at the rate of established range or pasture (0.14-0.2 Mg CO_2e/acre/year) if managed appropriately. Because these are land conversion practices and most of the decisions are independent of conservation program incentives, NRCS should establish a target of maintaining the current rate of implementation for Range Planting and for Forage and Biomass Planting.

Greenhouse Gas Reduction Goal

Goal	GHG Reduction Goal ($MMTCO_2e$ per year by 2025)[13]
Increase the use of Prescribed Grazing (Practice Code 528), Range Planting (Practice Code 550) and Forage and Biomass Planting (Practice Code 512) from 18 million acres to 27 million acres.	1.6

Partnership Opportunities

The grazing land profession has multiple existing partnerships through which these actions can be enhanced. On rangelands, the Society for Range Management and on pastureland, the American Forage and Grassland Council have a long history of working with other professional organizations and local producers via workshops, field days, and demonstrations to implement conservation practices. The National Grazing Lands Coalition is a nationwide collaborative effort to maintain and improve grazing land conservation. NRCS, NIFA, and ARS have strong connections to State and local Cooperative Extension Service staff and university departments. NRCS has also established strong collaborative partnerships with State and local conservation districts.

[13] For information on how to interpret this goal, see p. 6.

CASE STUDY

The Trigg family, which operates a 52,000-acre ranch in northeastern New Mexico, understands that good grazingland management benefits more than just livestock production, and they have been implementing these systems for almost 15 years. In 2002, they implemented a grazing management program intended to correct decades of overgrazing, shrub increase, and soil erosion. With financial and technical assistance from NRCS New Mexico staff, the Triggs installed new water developments and fencing to improve livestock distribution and allow for better herd management. Implementing techniques they learned in a Holistic Resource Management short-course, they also implemented a thorough and meticulous monitoring and recordkeeping system. Through stocking rate adjustments and changes in herd management, the Triggs documented increases in vegetation cover and in livestock performance.

Like any good business managers, the Triggs were also interested in finding new sources of income from their land. Generating and selling carbon offsets from rangeland management provided this opportunity. Through practices that they implemented from 2010 to 2015, the Triggs and several of their neighbors were able to sequester more than 100,000 metric tons of carbon dioxide, or the equivalent of removing more than 20,000 cars from the road for 1 year. The Triggs sold the offsets for more than $100,000, and they were able to reinvest almost 90 percent of that in improving their operation. The Triggs then creatively leveraged their income with the NRCS Environmental Quality Improvement Program (EQIP) to install a variety of conservation practices that furthered their management goals for the ranch.

The Triggs and their New Mexico neighbors were successful in improving their land health, enhancing their income, and contributing to GHG reductions because they had a comprehensive ranch management plan, and they were creative and bold enough to take advantage of new opportunities.

Rotational grazing in New Mexico. Photo courtesy of USDA NRCS.

Proposed Actions

FY 2016

Action	Lead USDA Agency(s)
Identify regions (Major Land Resource Areas) with the greatest potential for carbon sequestration and methane emission reduction via Prescribed Grazing.	NRCS
Implement conservation field trials for organic waste application in California.	NRCS

FY 2017

Action	Lead USDA Agency(s)
Adjust NRCS State Office priorities for providing technical assistance to grazing land managers in high priority regions.	NRCS
Initiate research and development effort to improve enteric fermentation/forage intake estimation model.	NRCS
Enroll an additional 1 million acres into the Prescribed Grazing, Range Planting, and Forage and Biomass Planting Practice Standards (total of 19 million acres).	NRCS

FY 2018

Action	Lead USDA Agency(s)
Enroll an additional 1 million acres into the Prescribed Grazing, Range Planting, and Forage and Biomass Planting Practice Standards (total of 20 million acres).	NRCS